SCIENCE 14

Learning Facilitator's Manual

Distance Learning

Alberta EDUCATION

Science 14

Module 6

LEARNING FACILITATOR'S MANUAL

Alberta
EDUCATION

Note

This Science Learning Facilitator's Manual contains answers to teacher-assessed assignments; therefore, it should be kept secure by the teacher. Students should not have access to these assignments until they are assigned in a supervised situation. The answers should be stored securely by the teacher at all times.

Science 14
Learning Facilitator's Manual
Module 6
Household Products and Reactions
Alberta Distance Learning Centre
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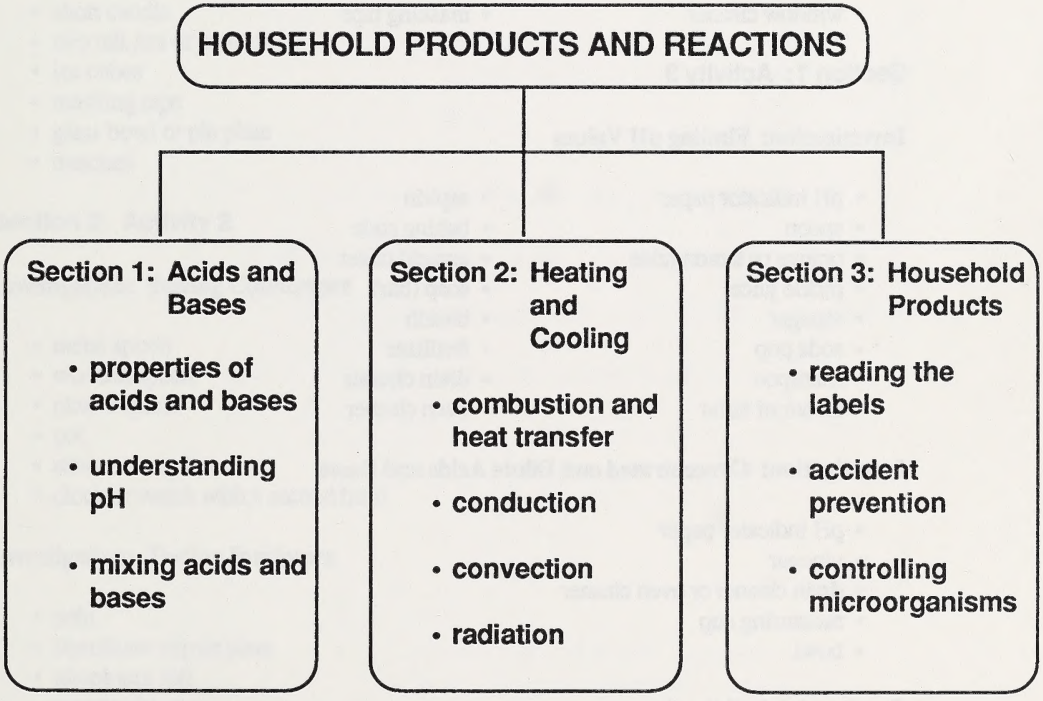
Module 6 – Household Products and Reactions: Overview

The objective of Module 6 is to have the student view household products and reactions from a science perspective. The student will look at the spectrum of household products and reactions, including reactions in the kitchen, heating and cooling systems, and hazardous chemicals. The student will use chemicals found in the home, rather than lab chemicals. These activities will draw attention to the variety, use, and dangers of products and reactions in the home. The section on hazardous chemicals will provide a background for the modules on the environment.



Materials You Need

The following is a list of materials necessary to complete the investigations in Module 6.

Section 1: Activity 1

- lemon juice
- vinegar
- pickle juice
- cream of tartar
- aspirin
- baking soda
- antacid tablets
- bleach
- window cleaner
- liquid soap
- 30 mL cooking oil
- six small jars
- six small nails (uncoated)
- spoon
- litmus paper
- one test tube
- one rubber stopper
- masking tape

Section 1: Activity 3

Investigation: Finding pH Values

- pH indicator paper
- spoon
- orange or lemon juice
- pickle juice
- vinegar
- soda pop
- shampoo
- cream of tartar
- aspirin
- baking soda
- antacid tablet
- soap (bar)
- bleach
- fertilizer
- drain cleaner
- oven cleaner

Investigation: Concentrated and Dilute Acids and Bases

- pH indicator paper
- vinegar
- drain cleaner or oven cleaner
- measuring cup
- bowl

Section 1: Activity 4

- pH indicator paper
- vinegar
- baking soda
- drain cleaner
- red cabbage (a few leaves)
- pot
- filter paper
- funnel

Section 1: Enrichment

- phenolphthalein indicator
- 25 mL vinegar
- antacid tablets (two different brands)
- measuring cup
- glass or jar
- tablespoon
- paper (one sheet or newspaper)
- one Robertson screw
- eyedropper

Section 2: Activity 1

- short candle
- two tall jars or beakers
- ice cubes
- masking tape
- glass bowl or pie plate
- matches

Section 2: Activity 2

Investigation: Testing Conductors

- metal spoon
- wooden spoon
- plastic spoon
- pot
- stove or hot plate
- clock or watch with a second hand

Investigation: Testing Insulators

- coin
- styrofoam cup or plate
- aluminum foil
- wooden block
- paper
- wool

Section 2: Activity 3

- drinking straw
- food colouring
- hot and cold tap water
- 1 L jar
- cake pan with sides at least 5 cm high

Section 2: Activity 4

Investigation: Absorber or Reflector

- coloured paper (2 cm × 2 cm)
  - black
  - blue
  - red
  - white
  - any other colours you might have
- coloured pencils, pens, or crayons
  - black
  - blue
  - red
  - white
  - any other colours you might have
- aluminum foil (2 cm × 2 cm)
- black metal (refrigerator magnet, screwdriver, etc.)
- sunlight (Use a lamp with a 100 W bulb if it is a cloudy day.)

Investigation: Which Colour is the Best Radiator?

- two indentical empty tin cans with labels peeled off
- black paint
- two cardboard lids to fit over the cans
- thermometer
- clock or watch with a second hand

Additional Resources

- Publications from Alberta Research Council
- Publications from National Research Council

Possible Media

- Video – *Conduction* (T.V. Ontario) available through ACCESS Network
- Video – *Convection* (T.V. Ontario) available through ACCESS Network
- Video – *Quest into Matter* (T.V. Ontario) available through ACCESS Network

Evaluation

The student's mark in this module can be determined by their work in the Assignment Booklet. Each student must complete all assignments. In this module the student is expected to complete three section assignments. The assignment breakdown is as follows:

Section 1	=	30 marks
Section 2	=	30 marks
Section 3	=	40 marks
TOTAL	=	100 marks

Teachers may also award marks for attendance, neatness, classroom participation, etc.

Section 1: Acids and Bases

This section utilizes many common household acids and bases in order to focus the student on the idea that chemicals are found and used at home every day, not just in a school lab. The hazards and warning labels are discussed.

Section 1: Activity 1

Investigation: Household Acids and Bases

STEP A	Name of Acid or Base	Appearance of Nail after 2 Days
Acids	*lemon juice*	*rusty, corroded*
	vinegar	*rusty, corroded*
	pickle juice	*rusty, corroded*
	cream of tartar	*rusty, corroded*
	aspirin	*rusty, corroded*
Bases	*baking soda*	*shiny, unchanged*
	antacid tablet	*shiny, unchanged*
	bleach	*shiny, unchanged*
	window cleaner	*shiny, unchanged*
	liquid soap	*shiny, unchanged*

STEP B		Taste
Acids	lemon juice	*sour*
	vinegar	*sour*
	pickle juice	*sour*
	cream of tartar	*sour*
	aspirin	*sour*
Bases	baking soda	*bitter*
	antacid tablet	*bitter*
	soap	*bitter*

STEP C

Substance	Litmus Colour	Acid or Base
lemon juice	*red*	*acid*
vinegar	*red*	*acid*
pickle juice	*red*	*acid*
cream of tartar	*red*	*acid*
aspirin	*red*	*acid*
baking soda	*blue*	*base*
antacid tablet	*blue*	*base*
soap	*blue*	*base*
bleach	*blue*	*base*
window cleaner	*blue*	*base*
liquid soap	*blue*	*base*

STEP D

Substance	Feel
lemon juice	*squeaky clean*
vinegar	*squeaky clean*
pickle juice	*squeaky clean*
cream of tartar	*squeaky clean*
aspirin	*squeaky clean*
baking soda	*slightly slippery*
antacid tablet	*slippery, chalky*
soap	*slippery*
bleach	*slippery*
window cleaner	*slippery*
liquid soap	*slippery*

STEP E

Substance	Oil Dissolved (yes or no)	Substance	Oil Dissolved (yes or no)
lemon juice	*no*	antacid tablet	*yes*
vinegar	*no*	soap	*yes*
pickle juice	*no*	bleach	*yes*
cream of tartar	*no*	window cleaner	*yes*
aspirin	*no*	liquid soap	*yes*
baking soda	*yes*		

1. Acids taste different than bases. Make a general statement about the tastes of acids and bases.

   In general, acids taste sour and bases taste bitter.

2. Acids and bases differ in their reactions with metals. Make a general statement about how acids react with metals and how bases react with metals.

   Acids react more with metals than bases do. The iron nails are rusted and corroded in acids but are relatively shiny in bases.

3. Litmus paper changes colour in acids and bases. Make a general statement about the colour of litmus paper in acids and bases.

   Litmus paper turns red in acids and blue in bases.

4. Acids and bases feel different. Make a general statement about the feel of acids and bases.

   Acids feel much like ordinary water. Some acids may have a squeaky feeling. Bases feel slippery.

5. Acids and bases react somewhat differently to oils. Make a general statement about the ability of acids and bases to dissolve oil.

   Acids do not dissolve oil very well. Bases dissolve oil readily.

Section 1: Activity 2

1. Do all bases have warning labels? Explain.

   No, weak bases, such as baking powder and some cleaners, do not have warning labels. Strong, corrosive bases, such as bleach, drain cleaner, and oven cleaner, have warning labels.

2. Are all bases harmful?

   No, there are some bases which you can eat, such as antacids and baking powder. Some cleaners and detergents also are not harmful.

3. Draw some of the symbols that are found on the labels and explain the meaning of each symbol.

You should have seen some of the following:

4. Do all acids have warning labels? Explain.

Not all acids have warning labels. Lemon juice, vinegar and shampoo are some examples of those that do not. Strong corrosive acids, such as battery acid and hydrochloric acid, have warning labels.

5. Are all acids harmful?

   No, many acids are used in food or food preparation, or for household use.

6. Draw some of the symbols that are found on the labels and explain the meaning of each symbol.

   You should have seen some of the following:

7. What types of substances in your home are bases?

   Most cleaning products, such as soaps, drain and oven cleaners, and bleaches, are bases.

8. What types of substances in your home are acids?

   Most acids are found in food products such as citrus juices, vinegar, and cream of tartar.

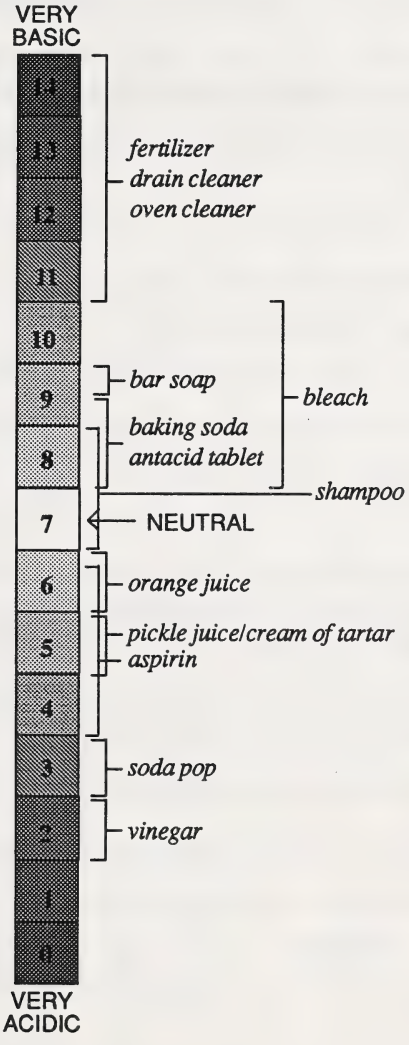
Section 1: Activity 3

Investigation: Finding pH Values

STEP A

Substance	pH	Substance	pH
orange juice	*6*	baking soda	*8-9*
pickle juice	*5*	antacid tablet	*8-9*
vinegar	*2*	bar soap	*9*
soda pop	*3*	bleach	*8-10*
shampoo	*7-8*	fertilizer	*11-14*
cream of tartar	*5*	drain cleaner	*11-14*
aspirin	*4-6*	oven cleaner	*11-14*

Rank the substances you tested by writing the name of the substance beside the pH of that substance.



1. What is the range of pH for acids?

   The range is from 0 to 7.

2. What is the range of pH for bases?

   The range is from 14 to 7.

3. How many times more acidic is an acid of pH = 1 than an acid of pH = 5?

   The acid with pH = 1 is 10 000 times more acidic than an acid with pH = 5.

4. How many times more basic is a substance of pH = 12 than a substance of pH = 9?

   The base with pH = 12 is 1000 times more basic than the base with pH = 9.

Investigation: Concentrated and Dilute Acids and Bases

5. What is the pH of the concentrated vinegar?

   The pH of the concentrated vinegar is 2.

6. What is the pH of the diluted vinegar solution? (25 mL vinegar + 250 mL water)

   The pH of the diluted vinegar solution (25 mL vinegar + 250 mL water) is 3.

7. What is the pH of this diluted vinegar solution? (25 mL vinegar + 500 mL water)

   The pH of the diluted vinegar solution (25mL vinegar + 500 mL water) is 4-5.

8. What is the pH of this diluted vinegar solution? (25 mL vinegar + 1000 mL water)

   The pH of the diluted vinegar solution (25 mL vinegar + 1 000 mL water) is 6-7.

STEP E

Solution	pH
25 mL cleaner	*11-14*
25 mL cleaner + 250 mL water	*11-14*
25 mL cleaner + 500 mL water	*9-10*
25 mL cleaner + 1000 mL water	*7-8*

9. Apply what you have learned to describe the proper method of treating someone who has had an accident with a concentrated acid or base. Describe how to treat a skin burn and how to treat someone who has swallowed a corrosive substance.

   Skin burn: Flush the skin immediately with lots of cold water. This will dilute and wash off the majority of the acid or base. Get the victim to a doctor immediately.
   Swallowed: Give the victim milk to drink (the acid or base will react with the milk instead of the body organs) and get the victim to a doctor immediately.

Section 1: Activity 4

1. What two things are always produced when an acid reacts with a base?

   Heat and new products are always produced when an acid reacts with a base.

2. What are the substances that react in a neutralization reaction?

   An acid and a base react in a neutralization reaction.

3. The first aid treatment often recommended for someone who swallows a corrosive acid or base is to drink milk and get medical help immediately. Why do you think milk, not water, is recommended?

   The acid or base will react with the milk rather than the body organs. Water will simply dilute the acid or base and further damage will occur.

Investigation: Home Brew Indicators

STEP B

Solution	Colour	pH
vinegar	*pink*	*2*
baking soda	*blue*	*8-9*
drain cleaner	*green*	*11-14*

4. What is the pH range at which red cabbage juice indicator is useful?

   2-11; it depends on the students' results.

5. Why or why would you not use natural juices to make commercial indicators?

   You would not use natural juices to make commercial indicators because it would be very difficult to obtain consistent results.

Section 1: Follow-up Activities

Extra Help

To review what was discussed in Section 1, decide whether the following statements are true or false. Place a **T** by those statements which are true and an **F** by those statements that are false. Rewrite the false statements to make them true.

1. _F_ Acids dissolve fats and grease.

   The investigation: Household Acids and Bases demonstrated that acids do not dissolve oils, fats, and grease.

2. _T_ Bases turn red litmus blue.

3. _F_ Acids taste bitter.

   Bases taste bitter. Acids taste sour.

4. _T_ Lemon juice turns litmus paper red.

5. _T_ An acid can neutralize a base.

6. _F_ A substance with a pH of 2.5 is a concentrated base.

   It is a strong acid.

7. _T_ Acids react with metals.

8. _F_ Battery acid is a weak acid.

   Battery acid is strong.

9. _F_ All acid-base reactions are useful.

   Not all acid-base reactions are useful.

10. _F_ The pH of acids is greater than 7.

    It is less than 7.

11. _T_ A neutral solution has a pH equal to 7.

12. _T_ Corrosive burns should be flushed with cold water immediately.

13. _T_ Many household cleaners are basic.

14. _F_ Indicators cause acids and bases to change colour.

    The indicators change color.

15. _T_ Adding water to an acid or base changes the pH of the acid or base.

Enrichment

Investigation: Antacid Effectiveness

STEP A	
Antacid	**Dissolving Time**
Tablet A	*varies (2-10 minutes)*
Tablet B	*varies (2-10 minutes)*

1. Which antacid would act the fastest? Why?

   The one which dissolves fastest would be the faster acting antacid.

2. What colour was the solution before you added the phenolphthalein indicator?

   Before phenolphthalein indicator was added, the solution was clear.

3. What colour did the solution turn when you added the phenolphthalein solution?

   After phenolphthalein indicator was added, the solution was pink.

STEP C	
Antacid	**Drops of Acid**
Tablet A	*varies (2-10 drops)*
Tablet B	*varies (2-10 drops)*

4. Phenolphthalein indicator changes colour in acids and bases. What colour is phenolphthalein in

   a. an acid? *clear*

   b. a base? *pink*

5. On the basis of both tests, which brand of antacid tablet would you deem most effective? Explain why you answered as you did.

   The most effective antacid would be the one which dissolves the fastest and neutralizes the most acid. The discomfort you feel from heartburn is due to excess acid which needs to be neutralized.

6. Explain why one antacid tablet might neutralize 10 mL of one acid but only 1 mL of another acid.

   One acid may be ten times more concentrated than the other. For example the pH of one acid might be 6 and the other might have a pH of 5.

7. Are your results from this experiment valid? What should you do to make your results more convincing to someone else?

   The results are probably not valid. You must do more than one trial because the measurements are rather crude and more precise measurments are required. The more times you do the experiment the better.

Section 2: Heating and Cooling

The three means of heat transfer are introduced and explained. Various household activities provide hands on activity. There are many additional resources available that deal with a main Canadian concern: keeping ourselves warm!

Section 2: Activity 1

1. What are some household processes that require heat?

   - *heating your home*
   - *heating your water (for washing, showers, etc.)*
   - *drying clothes*
   - *cooking*

2. Use the preceding word equation to answer the following questions.

   a. Why does a candle go out shortly after it is covered with a glass?

      The candle goes out a short while after it is covered by a glass because all of the oxygen under the glass is used up. No more oxygen can enter and the conbustion reaction must have oxygen to continue.

   b. Why is it dangerous to burn campfires or have any kind of fire outside on windy days?

      The wind provides more oxygen for the fire, making it burn faster and hotter. Also, the wind will cause the fire to spread much faster than it would on a calm day.

   c. Why do you see a white cloud of exhaust behind cars in the winter but not in the summer? What is the product of combustion in the exhaust which is responsible for the white cloud?

      One of the products of the combustion of gasoline is water vapour. In the winter this water vapour condenses into a visible cloud, just as your breath causes a visible cloud of water vapour to condense. In the summer the water vapour does not condense and remains an invisible gas.

3. The organic fuels which are commonly used today are refined from crude oil. What fuels did people use before oil-based fuels were discovered?

   People used wood, animal fats, dried manure, and then coal for fuel.

4. How many appliances in your household use controlled combustion? List as many as you can.

   The following list gives some of the possible answers.

   - *furnace*
   - *wood stove*
   - *gas clothes dryer*
   - *gas water heater*
   - *barbecue*
   - *automobile*
   - *outdoor camping stoves and lamps*
   - *butane lighters*
   - *propane torches*
   - *butane haircurlers*
   - *propane refrigerators*
   - *natural gas cooking stove*

Investigation: Heat Reactions

STEP B

OBSERVATION

You should discuss a variety of things about the flame such as shape, colour, heat, flickers, etc.

5. How do you know that this is a combustion reaction?

   There is a flame, heat is produced, and light is produced.

6. Where else in this investigation has there already been a combustion reaction?

   There was combustion in the match used to light the candle.

7. What has formed on the outside of the jar?

   Water droplets form on the outside of the jar.

8. Where did it come from?

   The water must have come from the combustion gases.

9. Feel the bottom of the beaker. What is another product of combustion?

   Heat is another product of combustion.

STEP F

OBSERVATION

The candle continues to burn for some time. Eventually the candle goes out. The water level in the jar rises. Note: If the jar makes a good seal with the pan, the water may not rise. If this is the case, repeat steps E and F, but put a toothpick in the pan so that the jar will not sit flat on the pan.

10. Why didn't the flame go out as soon as you covered the candle with the jar?

    There is enough oxygen in the jar to keep the candle burning for a while.

11. What two things are required for combustion to occur?

    A fuel and oxygen are required for combustion to occur. You might also say that a flame or a spark is required before the combustion can start.

12. What three things are produced when combustion occurs?

    Carbon dioxide, water vapour, and heat are produced when combustion occurs. You might also mention that carbon monoxide, nitrous oxides, and other waste gases are also produced.

13. Write an equation for the combustion reaction using the main reactants and products that you mentioned in the above questions.

    Fuel + Oxygen → Carbon Dioxide + Water Vapour + Heat

14. Use the principles of heat transfer to explain how hot pudding cools in the fridge, how the fridge then heats up your kitchen, and how the air conditioner then cools off the kitchen!

    The hot pudding transfers its heat to the refrigerator. The warmed up refrigerator then transfers the heat to the air in the kitchen. The warmed up air in the kitchen transfers the heat to the air conditioner in the kitchen window. The warmed up air conditioner transfers the heat to the air outside your house. Overall, the hot pudding transfers its heat to the air outside your home.

15. Some people will tell you that ice cubes transfer their cold to the iced tea in their glass. Use your knowledge of heat transfer to explain what is really happening.

    The iced tea solution is warmer than the ice cubes. This heat from the iced tea is transferred to the ice cubes, causing them to heat up and melt. This process will continue until the drink and the ice are the same temperature throughout (ice cold if there is still some ice left).

Section 2: Activity 2

1. List at least five appliances in your home that transfer heat by conduction.

    Stoves, irons, pots and pans, water heaters, coffee pots, electric frying pans, and many other appliances transfer heat by conduction.

Investigation: Testing Conductors

STEP B	OBSERVATION
wood	*coldest*
metal	*hottest*
plastic	*in between*

STEP C	OBSERVATION
wood	*coldest*
metal	*hottest*
plastic	*in between*

2. Which material was the best conductor of heat?

   Metal was the best conductor of heat.

3. Which material was the poorest conductor of heat?

   Wood was the poorest conductor of heat.

4. What explanations can you come up with to explain why metal is a good conductor of heat, as compared to wood or plastic?

   The particles in a metal are closely packed together. Therefore, one particle can easily bump into its neighbours and transfer the heat. Wood and plastic have large, complex particles with more space between them. A particle will have less chance of bumping into its neighbours and transferring the heat.

5. List five household items which are good conductors.

   Spoons, forks, and knives made of metal, pots and pans made of steel, copper or aluminium. Anything made of metals such as gold, silver, lead, steel, mercury, etc, are good conductors.

6. List five household items which are poor conductors.

   Anything made of wood, plastic, glass, wool, or cotton, is a poor conductor. Also, anything that traps air is a poor conductor of heat.

7. If you search through the cupboards and drawers of your home, you will probably find many examples of good conductors that are used for cooking. In many cases the good conductor has a handle or an end made of a poor conductor. A good example is a pot used for cooking. Why do these good conductors have a poor conductor attached?

   You would not be able to handle these pots and pans safely without the poor conductor.

Investigation: Testing Insulators

STEP A — OBSERVATION

Substance	Feeling
coin	*cold*
styrofoam	*warm*
aluminum	*cold*
wood	*warm*
paper	*warm*
wool	*warm*

STEP B — OBSERVATION

Substance	Feeling
coin	*cold*
styrofoam	*cool then warm*
aluminum	*cold*
wood	*cool*
paper	*cool*
wool	*cool then warm*

8. Which of the materials felt warmest?

   Styrofoam, wool, paper, and wood felt warmest.

9. Which of the materials felt coldest?

   Aluminum and the coin felt coldest.

10. Heat transfer sometimes happens very quickly. List some insulators that are used in your household to prevent burns to yourself or kitchen counters.

    Plastic, wood, cork, cloth (insulated oven mitts), fibreglass mats, rattan mats, etc, can all be used as insulators in your kitchen.

11. The space shuttle requires a special insulator in order to travel into space and return safely to Earth. Find some information about the insulator which is used on the space shuttle and write a brief paragraph. Encyclopedias and flight or space technology texts are good sources of information.

Some sources of information are encyclopedias, a dictionary of space technology, and texts on flight. In general, there are four types of tile used on the space suttle which range from high temperature (reinforced carbon) to lower temperature (Nomex felt). This is an overly simplistic explanation and you should read the complete explanations provided in other resources.

Section 2: Activity 3

Investigation: Convection Currents

STEP D

OBSERVATION

The food colouring spreads out along the bottom and then it rises along the sides of the jar. Once the food colouring reaches the top, it moves to the centre of the jar and drops down to the bottom. Eventually the water is uniformly coloured.

1. Draw a picture of the heat flow you observed in the jar.

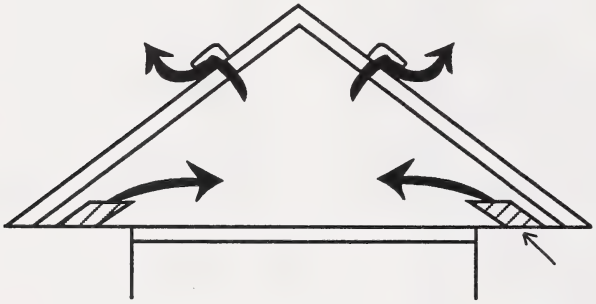
2. Explain how you could show the convection currents in air to someone who does not believe that they exist.

   A good place to see these currents is around a burning candle or a sunny spot on the floor. Smoke from a smouldering string or blown out candle is usually visible and will show the convection currents. Always be extremely careful with fire!

3. List as many devices (or parts of devices) as you can which use convection as a means of heating.

   Ovens, furnaces, stoves and fireplaces, coffee makers, dishwashers, hairdryers, clothes dryers, and many others use convection as a means of heating.

4. Draw the convection currents which would be set up in the attic.



5. Explain why convection can occur in liquids and gases but not in solids.

   Convection is the transfer of heat by movement within a substance. The particles of gases and liquids are free to move, but the particles in a solid are fixed in place. Therefore, solids can only transfer heat by conduction.

Section 2: Activity 4

Investigation: Absorber or Reflector?

<table>
<tr><th>Substance</th><th>Colour</th><th>Starting Temperature</th><th>Temperature after 5 Minutes</th></tr>
<tr><td rowspan="5">paper or pencil</td><td>black</td><td rowspan="5">All colours should feel about the same at the start.</td><td>warmest</td></tr>
<tr><td>blue</td><td>warm</td></tr>
<tr><td>red</td><td>cooler than blue</td></tr>
<tr><td>white</td><td>slightly warmer than at start</td></tr>
<tr><td>any others</td><td>other colours will vary in general; the closer to black, the warmer; the closer to white, the cooler</td></tr>
<tr><td>aluminum foil</td><td>silver</td><td>cold</td><td>cold</td></tr>
<tr><td>black metal</td><td>black</td><td>cold</td><td>warm</td></tr>
</table>

1. Which colour is the best absorber of solar radiation?

   Black is the best absorber of solar radiation.

2. List the colours from best absorber to worst absorber of solar radiation.

   The colours arranged in order from best absorber to worst absorber of solar radiation are black, blue, red, and white. The other colours will fit in between these as explained in the observations.

3. Which material is the best absorber of solar radiation (paper, aluminum foil, or black metal)?

   Black metal is the best absorber of solar radiation.

4. Explain why you think colour is important to the ability of a substance to absorb or reflect heat.

   Black colours absorb more heat than all the other colours. The closer the colour is to black, the more heat it will absorb. White is the best reflector and the closer the colour is to white, the better it will reflect heat.

5. Where did the heat come from and how did it get to the substances in your experiment?

   The heat came from the sun. The heat got to the substances from the sun by means of solar radiation.

Investigation: Which Colour Is the Best Radiator?

STEP B

OBSERVATION

Results will vary due to different starting temperatures, size of can, and other variables. A decrease in the temperature should be observed.

STEP C

OBSERVATION

Results will vary. There should be a greater decrease in temperature, as compared to the unpainted can.

6. Which can (black or silver) had the lowest water temperature after fifteen minutes?

   The black can had the lowest water temperature after fifteen minutes.

7. Which colour is the best radiator?

   Black is the best radiator.

8. What appliances in your home use colour to keep heat in?

   Thermos bottles, space blankets, kettles, and any other silver or white, shiny appliances all use colour to keep the heat in.

9. Which appliances in your home use colour to help get rid of extra heat?

   Radiators in the car, refrigerators, deep freezes, and any other dark coloured appliances all use colour to help get rid of extra heat.

10. What minor modifications could you make to your home to increase the amount of solar energy received in a passive way?

    Increase insulation, keep the curtains open in daytime and closed at night, and plant deciduous trees (those that lose their leaves in winter) on the south side of the house. Other more major modifications may be mentioned.

11. In your climate, would passive solar heating provide all the required heat in the winter? Why or why not?

    The chances are that passive solar heating would not provide all the required heat in the winter. Northern climates receive little sun in the winter and the temperatures tend to be very cold.

12. Assume that you are building an active solar heated home.

    a. Do you still need a conventional gas, oil, or electric furnace?

       Absolutely. During a cold spell, the energy provided by the active solar system may not provide enough heat.

    b. What is one advantage of an active solar heating system, as compared to a passive system?

       An active system can store heat when it is plentiful and release it at times when it is necessary.

    c. What else could the active solar heating system be used for?

       You can use it to heat water (for domestic use or for a swimming pool).

    d. What would happen if the electricity went off in winter?

       The furnace and active solar heating systems would not function. Unless you have a wood stove or fireplace as a source of heat, the house will cool down.

e. What colour would you paint the solar collector? Why?

A solar collector should be painted black because black is the best absorber of solar radiation.

13. Explain how the thermos bottle reduces each type of heat transfer.

a. Conduction: *The vacuum between the inner and outer walls prevents heat loss by conduction. Also, the cork or cup is usually made of hollow plastic.*

b. Convection: *The vacuum between the inner and outer walls also prevents heat loss due to convection since there is no fluid to move.*

c. Radiation: *The inner and outer walls are mirrored (painted silver) which makes them poor radiators.*

Section 2: Follow-up Activities

Extra Help

Answer the multiple choice questions to check your understanding of heat, heat transfer and household devices, and the processes that involve heat transfer.

1. A chemical reaction that needs oxygen and a fuel to produce heat is

a. conduction
b. *combustion*
c. corrosion
d. acid-base

2. When a cold glass is held above a burning candle

a. the candle flame goes out
b. *the glass gets water drops on the outside*
c. the glass cools down
d. the flame burns brighter

3. If you open the outside door on your house when it is 22° C inside and –15°C outside, the heat flow will be from

a. *inside to outside*
b. outside to inside
c. inside to inside
d. outside to outside

4. A cup that has a hot liquid poured into it gets hot as well. This happens because heat is transferred by

   a. convection
   b. *conduction*
   c. radiation
   d. corrosion

5. The best spoon to use for stirring a hot liquid for a long time would have a handle made of

   a. stainless steel
   b. aluminum
   c. glass
   d. *plastic*

6. Water in an electric kettle is heated by

   a. conduction
   b. convection
   c. radiation
   d. *both a. and b.*

7. Radiation has occurred when

   a. spoons for stirring hot soup get hot
   b. currents cause water to get warm throughout
   c. *the sun heats the inside of your car*
   d. a propane barbecue cooks your steak

8. In convection, heat is transferred in

   a. solids
   b. *fluids*
   c. plastics
   d. metals

9. The best radiator of heat would be a

   a. *black can*
   b. grey can
   c. white can
   d. blue can

10. A substance that slows or limits the flow of heat is called a(n)

    a. radiator
    b. *insulator*
    c. conductor
    d. regulator

11. A convection current involves

    a. radiation through a vacuum
    b. *moving gases and liquids*
    c. solids touching
    d. light heating by absorption

12. Metals are good conductors because the molecules are

    a. *close together*
    b. far apart
    c. not present
    d. not moving

13. Heat transfer from the sun occurs by

    a. conduction
    b. convection
    c. *radiation*
    d. insulation

14. Solar houses take advantage of heat transferred from the sun to the house by

    a. convection
    b. insulation
    c. *radiation*
    d. conduction

15. A thermos bottle works on the heat principles of

    a. conduction
    b. convection
    c. radiation
    d. *all of the above*

Enrichment

1. Your senses pick up visible light (you detect it with your eyes) and infrared light (you feel it as heat with your skin). Explain why microwave, ultraviolet, x-rays, and gamma rays may be dangerous to you.

   You have no senses to tell you that you are being exposed to radiation. Later, when your skin is burnt or when you suffer from some cancer or other illness due to the radiation, it is too late. As an analogy, imagine that you have no heat sensors in your skin. When you put your hand on the hot stove element, you feel no pain. The burn will be extremely bad if you leave your hand on a hot stove element for even a short time. Similarly, you can be exposed to ultraviolet radiation and not feel a thing. Later you will see the results as a serious sunburn.

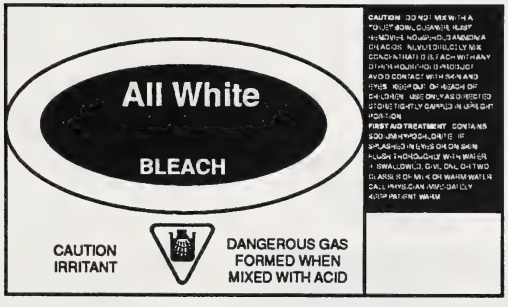
Section 3: Household Products

This section provides the student with a close look at the safety labels on household products. This is an excellent place to stress the safe handling and proper use of household chemicals. Also, some fundamental preventative measures and post accident treatments are highlighted.

Section 3: Activity 1

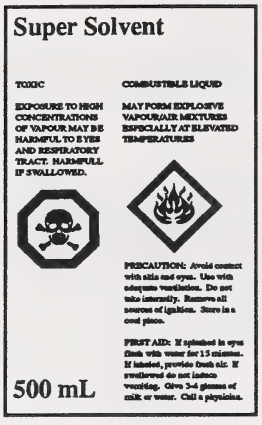
1. For each of the product labels given, explain what the symbol means. Include both the type and degree of the hazard.

   a.



Type: *corrosive* Degree: *caution*

b.



Type: *poison*

Degree: *danger*

Type: *flammable*

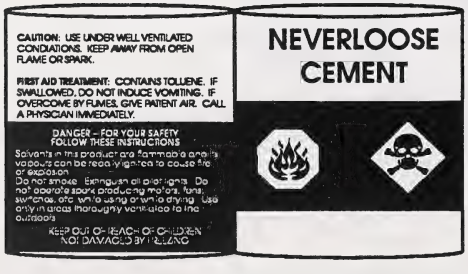
Degree: *warning*

c.

Type: *poison*

Degree: *danger*

d.



Type: *flammable*

Degree: *danger*

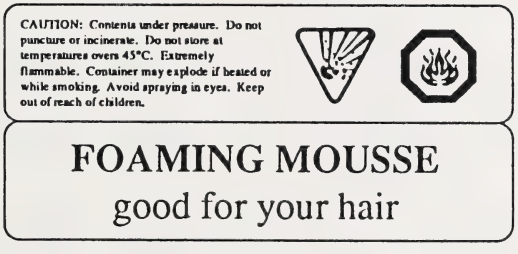
Type: *poison*

Degree: *warning*

e.

Type: *corrosive* Degree: *caution*

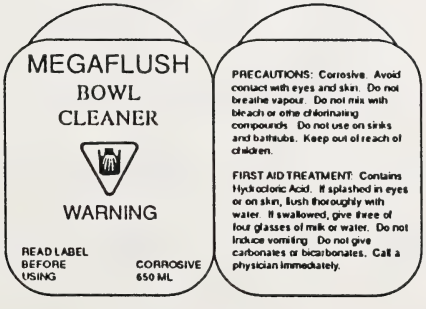
f.



Type: *explosive* Type: *flammable*

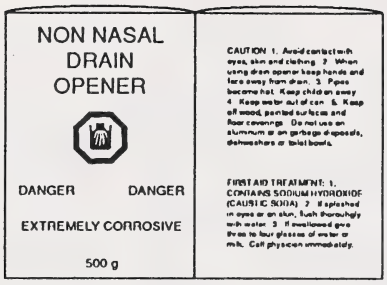
Degree: *caution* Degree: *danger*

g.



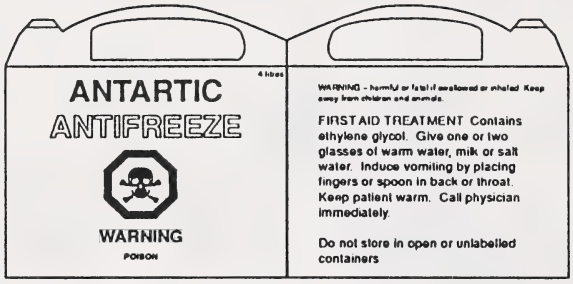
Type: *corrosive* Degree: *caution*

h.



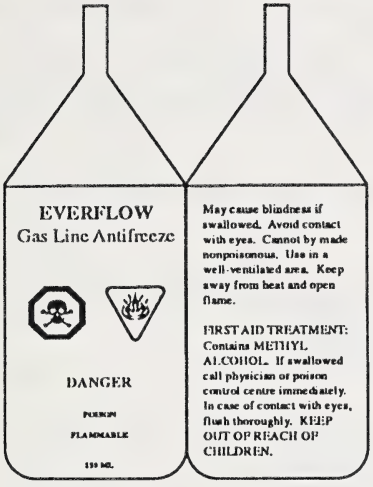
Type: *corrosive* Degree: *danger*

i.



Type: *poison* Degree: *danger*

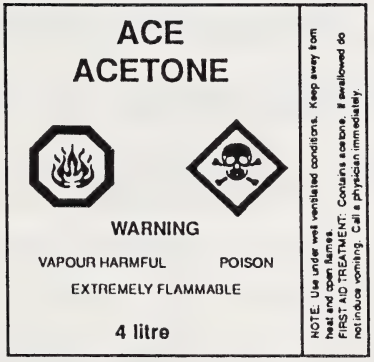
j.



Type: *poison* Type: *flammable*

Degree: *danger* Degree: *caution*

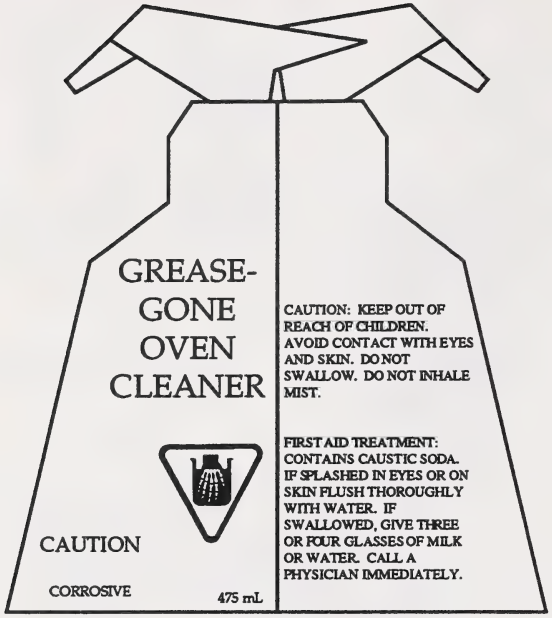
k.



Type: *flammable* Type: *poison*

Degree: *danger* Degree: *warning*

1.



Type: *corrosive* Degree: *caution*

2. Why is it so important for household products to be labelled with hazardous product symbols?

   If products are potential dangers it is important to know what to do to protect yourself and others.

3. On which products given in question 1 are there cautions against heating?

   Super solvent, Thinall paint thinner, acetone, Neverloose cement, foaming mousse, and gasline antifreeze.

4. Why are there storage suggestions on the labels of some dangerous household substances?

   If products that are flammable or explosive are stored in hot places, they may catch fire or explode. Suggestions for storage help avoid potential dangers.

Section 3: Activity 2

1. Look again at the labels given in question 1 of Activity 1. Most of them indicate a first aid treatment that can be given immediately if a product is used incorrectly or if it causes injury or illness.

   a. Why is it important to give immediate attention to someone who has used a product incorrectly?

      If a product is swallowed or inhaled, the victim could die without immediate action. Also, physicians should be called because they can treat the victim properly.

   b. List the types of first aid treatments that are given on a product label.

      - *If splashed in eyes or on skin, flush with water.*
      - *Do not induce vomiting.*
      - *Give milk or water.*
      - *Give patient air.*
      - *Induce vomiting.*

2. What is the reason for giving a person who has swallowed a corrosive substance large amounts of milk or water?

   Large amounts of milk or water will dilute the acid or base. The corrosive substance will react with the milk rather than the stomach walls.

3. Why do some labels caution against heating?

   Heating something flammable or explosive may cause the substance to ignite and burn uncontrollably or cause the container to explode.

4. Read the labels on some cleaning products in your home. Which products caution against mixing?

   Household bleach, toilet bowl cleaner, and others may caution against mixing.

5. The following substances are stored dangerously. Suggest where or how they should be safely stored (especially if there are small children in the house).

   a. drain cleaner under the kitchen sink

      Store in a high cupboard so that small children cannot reach the drain cleaner.

b. turpentine by the furnace

Store in a cool place in a shed or garage. Store out of reach of small children.

c. can of aerosol butane in the car

Store in a cool place so it will not overheat and explode.

d. an open bottle of bleach beside the washer

Store out of reach of small children. Bleach should also be stored with the lid on so that small children do not swallow or inhale it.

e. an old, corroded car battery sitting in the garage

Wear protective gloves and clothes to take the battery to a recycling depot. Your local garage may take the battery free of charge.

f. an open can of turpentine with a paint brush in it

Remove and clean the paint brush. Close the can of turpentine and store it out of reach of children.

g. a medicine bottle (with the safety cap removed) sitting on the kitchen counter

Replace the safety cap on the medicine bottle and store in a locked cabinet.

6. In each of the following identify what is wrong and explain what should have been done.

a. A gardener used a pesticide on his cabbage. The unused pesticide was poured into a baby-food jar and stored in the shed.

The unused pesticide should have been stored in the original container. Chemicals should never be stored in different containers, especially food containers.

b. A woman sprayed a weed killer on her lawn on a windy day.

She should not spray on a windy day. The wind can carry the herbicide to areas where it is not wanted, to a neighbours home, or onto other people.

c. A man was spreading a granular fertilizer on his lawn. Before he was finished, he went to eat supper without washing his hands or changing his clothes.

He should wash his hands and change his clothes before eating. He should also finish the job of spreading the fertilizer, clean up all the tools that he used, store the unused herbicide, ensure the clothes that he was wearing get washed immediately by themselves, and have a shower.

d. A child was asked to spray some roses with an aerosol bug spray. The wind was blowing in the child's face as the roses were being sprayed.

The child should not have been spraying the bug spray – an adult should have been doing the spraying. Never spray into the wind, as the chemical gets blown back into your face and onto your clothes.

Section 3: Activity 3

1. What are the main problems that bacteria cause in the kitchen?

   Bacteria cause food spoilage and food poisoning. Human diseases can also be transmitted through tainted food and utensils.

2. What are the main problems that fungi cause in the kitchen?

   Fungi mainly spoil foods and produce mildew in the kitchen. There are poisonous mushrooms which will cause illness or death. Eat only mushrooms that you are sure are safe to eat.

3. If you keep meat frozen in the freezer, it has little chance to spoil. What stops the microorganisms from growing?

   Improper growing temperatures stop microorganisms from growing.

4. How does cleaning the utensils, countertops, and the stove affect microorganisms?

   Cleaning (especially with detergents) will remove the food that microorganisms feed on and will also remove or destroy the microorganisms.

5. Dried foods are less likely to spoil than moist foods. What does this mean in terms of what microorganisms need to grow?

   Microorganisms need water to grow. Dried foods can be kept for very long periods of time, as long as they are not allowed to get wet.

6. Why should you use soap and cleansers, rather than plain water, when washing your hands and cleaning the kitchen?

   Soaps and cleaners will actually kill many microorganisms. Plain water will not kill the microorganisms.

7. Freeze-dried foods are very popular with hikers and campers. Why do you think this is so?

   Freeze-drying foods produces a nutritious, lightweight, and very safe food. Freeze-dried foods are packaged in sealed packages and will keep for very long periods of time.

8. Here are some facts about microorganisms. In the space provided write the numbers of the food handling rules which match each fact. You may use more than one rule for each fact.

   a. Most food-poisoning bacteria like room temperatures.

      4, 5, 6, 7, 14, 15, 18

   b. Some food-spoiling bacteria can live in the refrigerator.

      10, 13, 18

   c. Bacteria live in towels and dish cloths.

      12

   d. Microorganisms found in raw meat can get into other foods that touch places where the raw meat has been.

      3, 4, 10, 12

   e. Microorganisms are found everywhere – on your hands, on your skin, in your mouth, on countertops, on appliances, and in food.

      1, 2, 3, 8, 12, 13, 16, 17, 20

   f. It takes only a few microorganisms to cause problems.

      6

   g. Cooked food which is left out will cool quickly, allowing microorganisms to start to grow.

      4, 5, 6, 7

   h. Microorganisms grow and reproduce very quickly.

      all the rules

   i. Microorganisms need food to grow.

      4, 5, 6, 8, 9, 12, 13

j. Most microorganisms and their spores are killed by boiling.

14

9. List as many ways of preserving food as you can. Include methods used both by yourself and by the food companies.

Lists should include freezing, canning, drying, and using chemical preservatives. More sophisticated methods may include vacuum packaging, irradiation, and pressure cooking.

Section 3: Follow-up Activities

Extra Help

1.

danger; poison

caution; corrosive

warning; flammable

warning; explosive

2. Complete each of the following statements.

a. Keep explosive and flammable substances *in cool places away from sparks and flames.*

b. Keep poisonous substances *tightly closed and in cupboards that are out of the reach of children.*

c. Store medicines in *locked cupboards.*

d. Keep corrosive substances *out of reach of children.*

3. a. List three beneficial uses of microorganisms.

   - *dairy products*
   - *medicines*
   - *foods*

   b. List three harmful effects of microorganisms.

   - *food spoilage*
   - *food poisoning*
   - *plant and human diseases*

4. List the three growth requirements of microorganisms.

   - *moisture*
   - *food*
   - *favourable temperatures*

Enrichment

You may want to further investigate different types of food poisoning and their causes. Write a report on one of the following microorganisms that cause food poisoning.

- *Staphylococcus*
- *Salmonella*
- *Clostridium botulinum*

Include the following points in your report.

- What are the symptoms of the poisoning?
- How is the poisoning treated?
- What safety precautions would you follow to avoid this kind of poisoning?

POISON	SYMPTOMS	TREATMENTS	PRECAUTIONS
Salmonella *Bacteria that are multiplying in the body (stomach and intestines) make the patient ill.*	*Symptoms usually begin twelve to fourty-eight hours after eating the infected food. The victim usually experiences vomiting, cramps, nausea, diarrhea, and sometimes headache and fever. Severe cases may also experience shock, dehydration, and kidney failure. Salmonella is the most frequent cause of mass poisonings.*	*Bed rest is required. No food or drink should be given until vomiting and nausea stop, and then only light tea and soup should be given. If vomiting continues, a salt solution to prevent dehydration should be given intravenously by medical personnel.*	*Any food which tastes or smells abnormal should be avioded. Salmonella is found on almost all the foods that you eat. It is important that foods are cooked thoroughly or eaten while they are fresh.*

POISON	SYMPTOMS	TREATMENTS	PRECAUTIONS
Staphylococcus *These bacteria multiply in food and produce a toxin (poison). These toxins, not the bacteria, are responsible for making people sick.*	*Symptoms usually begin two to four hours after eating the infected food. The victim usually experiences nausea, vomiting, cramps, diarrhea, and sometimes sweating and excessive salivation. In severe cases, there can be prostration, shock, and blood and mucus in the stools.*	*The victim requires bed rest and easy access to a bathroom. No food or drink should be given until vomiting and nausea stop. Light tea, light soup with salt, and thin cereal should then be given. Proper medication is required if vomiting and nausea persist.*	*Any person who is infected with Staphylococcus must not handle food. It takes only four hours for the infected food to produce enough toxins to be poisonous. Cooking kills the germs, but does not affect the toxins. Refrigerate all foods at or below 5°C.*

POISON	SYMPTOMS	TREATMENTS	PRECAUTIONS
Clostridium botulinum *These bacteria multiply in food and produce one of the most poisonous substances known. (One drop can kill 50 000 people). Botulism occurs most often in preserved foods.*	*Symptoms begin eighteen to thirty-six hours after eating the contaminated food. The victim experiences fatigue, dizziness, blurred sight, cramps, nausea, and vomiting. Muscles are also weakened, making breathing, swallowing, and speaking very difficult. Death results from inability to breathe or heart failure.*	*Medical attention is required immediately. The victim's stomach is usually washed and pumped out. The intestines are also flushed, using an enema. The patient is kept in bed in a darkened room and is fed intravenously. A respirator might be also necessary.*	*Eat fresh foods rather than canned foods. Boil any food of which you are uncertain. Ensure that you know exactly what you are doing when canning your own food.*

Module Summary

The student should now have a better scientific view of reactions and products in the home. Hopefully this awareness, especially in potentially hazardous situations, will be useful throughout the student's life. The student should have a better foundation for the next modules dealing with the environment. Awareness of the effects of common household reactions will help the student focus on an individual's impact on the environment.

Key to the Assignment Book

Section 1 Assignment (30 marks)

(4 marks) 1. Give four properties of acids and four properties of bases.

The student's list should include four of the following properties of acids.

- *taste sour*
- *turn litmus red*
- *react with metals*
- *neutralize bases*
- *cause colour changes*
- *feel "squeaky clean"*
- *do not dissolve oils*

The student's list should include four of the following properties of bases.

- *taste bitter*
- *feel slippery*
- *turn litmus blue*
- *dissolve oils*
- *neutralize acids*
- *do not react with metals*

(1 mark) 2. What is a potential problem with using taste and touch as tests for acids and bases?

Some acids and bases are corrosive or poisonous. You should not touch or taste substances that you are unsure of.

(1 mark) 3. Soaps and detergents are made with bases. What property of bases makes them good ingredients for soap?

Bases dissolve oils and grease.

(2 marks) 4. The following warning label is found on a household cleaner. Explain the meaning of the label.

The label means Warning; Corrosive.

(2 marks) 5. The following warning label is found on a household product. Explain the meaning of the label.

The label means Danger; Poison.

(2 marks) 6. Discuss the importance of being able to tell the difference between dangerous and nondangerous acids and bases.

A person able to tell the difference will avoid or take proper precautions when using harmful or dangerous substances. Such precautions reduce the chance of being burned by corrosive substances.

(2 marks) 7. Based upon your knowledge of acids and bases and the tests that you have done, make a generalization about the most common uses for acids and bases. Be sure to explain your answer and use examples.

Most acids are foods (lemon juice, fruits, pop, etc.).
Most bases are cleaners (oven cleaner, dish detergents, drain cleaners, etc.).

(5 marks) 8. Classify the substances (in the chart) as very acidic, moderately acidic, weakly acidic, neutral, weakly basic, moderately basic, or strongly basic.

Substance	pH	Classification
buttermilk	5.4	*weakly acidic*
apple	3.0	*moderately acidic*
cabbage	5.3	*weakly acidic*
stomach acid	2.0	*very acidic*
human blood	7.4	*weakly basic*
distilled water	7.0	*neutral*
pickles	3.7	*moderately acidic*
drain cleaner	12	*strongly basic*
lye (in soap)	14	*strongly basic*
bread	5.5	*weakly acidic*
beer	4.5	*moderately acidic*
urine	6.6	*weakly acidic*
saliva	7.0	*neutral*
baking soda	8.6	*weakly basic*
jelly	3.2	*moderately acidic*

(4 marks) 9. Write a paragraph on the difference between soap, liquid detergent, and powdered detergent. Use an encyclopedia or science book for reference.

The following main points should be covered.

Soaps are made by reacting fats and basic substances (often sodium hydroxide). Soaps will react with the metals in hard water to produce scum (bathtub ring). Liquid and powdered detergents are made by more complex chemical reactions. Detergents will not react with the particles in water to produce scum. This is preferable when washing dishes or laundry.

(2 marks) 10. Compare how acids and bases react with metals.

Acids react with metals, bases do not.

(2 marks) 11. The pH of an acid is 2. What will be the approximate pH if 10 mL of this acid is mixed with 90 mL of water?

pH = 3; diluted by a factor of 10

(2 marks) 12. The pH of a base is 14. What will be the approximate pH if 5 mL of this base is mixed with 495 mL of water?

pH = 12; diluted by a factor of 100

(1 mark) 13. New products are produced when acids and bases react. What else is produced in an acid-base reaction?

Heat is always produced in an acid-base reaction.

Section 2 Assignment (30 marks)

(2 marks) 1. What two things are required for any combustion reaction?

Oxygen and a fuel are required for all combustion reations.

(3 marks) 2. What three things are produced in a combustion reaction?

Carbon dioxide, water vapor, and heat are produced in combustion reations.

(3 marks) 3. List the three methods of heat transfer.

The three methods of heat transfer are conduction, convection, and radiation.

(1 mark) 4. Which is a better conductor of heat, wood or copper?

Copper is the better conductor of heat.

(1 mark) 5. Which is the best insulator, aluminum or paper?

Paper is the best insulator.

(2 mark) 6. Two materials, A and B, are sitting outside at – 20° C. When you touch them with your bare finger, A feels colder than B.

a. Which is the better insulator, A or B?

B is the better insulator because it feels warmer (transfers less heat).

b. Which is the better conductor, A or B?

A is the better conductor because it feels colder.

(1 mark) 7. If you poured hot coloured water into a lake, would it float or sink?

It would float. Warmer fluids rise above colder fluids.

(1 mark) 8. Define the term *convection current.*

Movement of fluids where hot parts rise and cooler parts sink to take their place.

(2 marks) 9. Explain the difference between a forced air heating system and a passive heating system.

Forced air: heated air is blown by a fan to all rooms in a house.

Passive: heated air rises and colder air is drawn down to the furnace by convection.

(2 marks) 10. Earth gets most of its energy from the sun. How does this energy travel through space?

It travels as light (solar radiation). Photons of light can travel through a vacuum.

(3 marks) 11. If you were asked to make a special suit of clothing to be used in the Arctic winter, what kind of materials would you use and what colours would you make the inside and outside of the suit?

The suit should be constructed with a windproof outer shell and a fluffy insulation that traps air. A white colour should be used to prevent radiation of heat. The student could also argue that a dark outside colour could be used in order to absorb solar radiation.

(3 marks) 12. Discuss what colour of house shingles makes the most sense in the Canadian climate. Why did you answer as you did?

Light or white shingles should be used. Since the attic is insulated in a conventional house, dark shingles will absorb the sun's rays in winter, but the heat will not be available to the living area of the house. White shingles will not get as hot in the summer and will probably last longer.

(2 marks) 13. Why can you see your breath when you go outside on a cold winter day?

The linings of the lungs, throat, and nose are moist. The air picks up this moisture which freezes in the cold air when you exhale.

(4 marks) 14. *Hypothermia* is a word that every outdoorsperson should know.

a. Look up the word *hypothermia* in a dictionary and write down the definition.

Hypothermia: subnormal temperature of the body (lower than normal body temperature)

b. Explain, in terms of heat transfer, why it can be very dangerous to canoe on a river or lake even on a warm day.

Water can be very cold even on warm days. Once a person falls into cold water, heat transfer occurs quickly and hypothermia can set in even before the person reaches shore.

Section 3 Assignment (40 marks)

(15 marks) 1. Choose three household products which were not used as examples of product labels in this section.

i) Draw pictures of the labels. Include the product name, hazardous product symbols, safety precautions, and first aid treatments.

ii) Tell what the symbols on each product mean and what could happen if the product is improperly handled. Explain any cautions about mixing the product with other substances and how you would treat a person who needed first aid treatment related to the product.

- *The symbols show the **TYPE OF HAZARD** in a product.*

Poison

Flammable

Explosive

Corrosive

- *The frames show the **DEGREE** of that hazard (or, in other words, how dangerous the product is).*

Danger

Warning

Caution

Here are the hazardous product symbols required by the Government of Canada to indicate if a household product is dangerous.

(6 marks) 2. Use an encyclopedia or science text to find out how chlorine gas and hydrochloric acid affect a person. Write a brief report on these two products of dangerous household product reactions.

The following points should be covered for each substance.

- *chlorine gas*
  - *can kill you if it is inhaled*
  - *mixes with hydrogen to form hydrochloric acid*

- *hydrochloric acid*
  - *destroys flesh (corrosive)*
  - *harms the lungs if it is inhaled*
  - *can be fatal if swallowed*
  - *causes coughing and choking*

(2 marks) 3. There are two types of products that you should keep away from heat. Tell what these two types are, why they should be kept away from heat, and where they should be stored.

Explosive products and flammable products should be stored in a cool place away from heat and sparks.

(6 marks) 4. Explain three specific methods of stopping or slowing down the growth of microorganisms in your food. Each method should be related to a different growth requirement of microorganisms.

Answers should apply to three needs of microorganisms.

- *The growth of microorganisms can be stopped or slowed down by reducing their food source. This can be done by cleaning thoroughly with soap or detergent.*

- *Drying food will slow or stop the growth of microorganisms by depleting their source of moisture.*

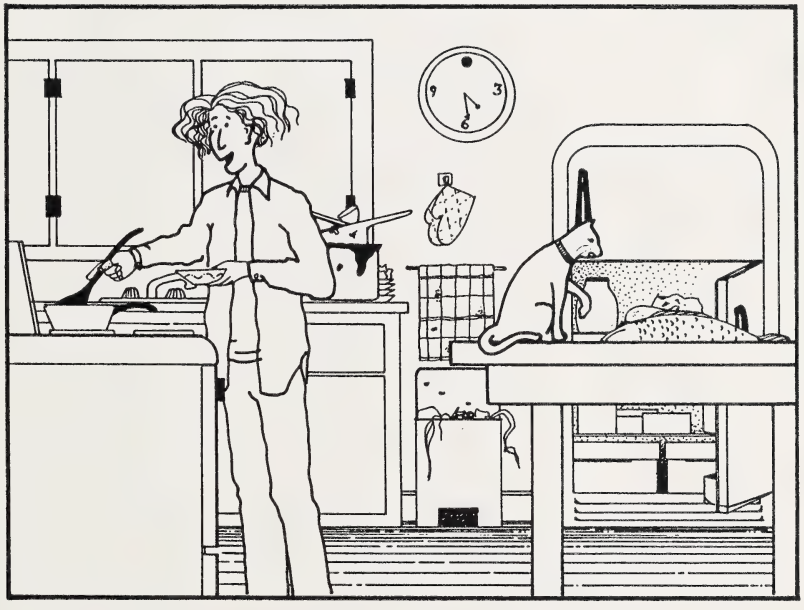
- *By refrigerating, freezing, cooking, or boiling food, a microorganism's favourable temperature is upset.*

(6 marks) 5. Investigate the beneficial uses of microorganisms and write a brief report on your findings.

Beneficial uses of microorganisms include the following.

- *cheese making (using bacteria)*
- *bread making (using yeast)*
- *production of antibiotics (using penicillium mold)*
- *growing edible mushrooms*
- *production of alcohol (using yeast)*
- *manufacture of synthetic vitamins (using bacteria)*
- *scientific research*

(5 marks) 6. Looking at the following graphic, list all the places in the kitchen where microorganisms would be found. Give one household food handling guideline that applies to safe food handling for each specific place in which microorganisms are found.



- *hands: wash your hands with soap or wear gloves*
- *countertops: wash with soap*
- *cat: keep out of kitchen area and off counters*
- *fridge: keep at proper temperature and keep clean*
- *towels: wash dishtowels and handtowels often*
- *garbage: take out the garbage and wash the garbage container with soap*
- *floor: wash with soap or detergent*

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